Flower colour polymorphism in *Geranium nepalense* (Geraniaceae): adaptation to non-pollinator agents

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**INTRODUCTION**

Flower colour polymorphism has interested ecologists and naturalist for a long time (e.g. Faegri and van der Pijl 1979, Fenster et al. 2004, Harder and Johnson 2009, Delph and Kelly 2014). Visitors can use flower colour as cue during pollination process (Stanton 1987, Rausher and Fry 1993, Levin and Brack 1995, Jones and Reithel 2001), thereby, different flower colours may influence pollinator visitation rates and even pollen removal and deposition. When pollen limitation exist, visitor discrimination sometimes causes reproductive success variation (Waser and Price 1981, Levin and Brack 1995, Campbell et al. 2010, 2012, Malerba and Nattero 2012). This pattern is called pollinator mediated selection (Clegg and Durbin 2000, Coberley and Rausher 2003, Johnson 2010).

On the other hand, non-pollinator factors could also drive and maintain flower colour polymorphism. Non-pollinator factors refers to pleiotropic effect, indirect selection and neutral theory (Rausher 2008). These factors include water, temperature, herbivore and so on (Simms and Bucher 1996, Strauss et al. 2004; Caruso et al. 2010). In several studies, white morph performed better when water supplement is sufficient, whereas pigmented morph performed better...